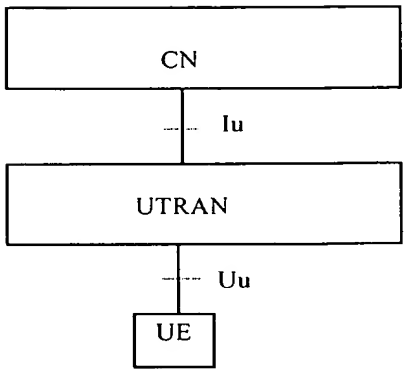


UTRAN	UMTS Terrestrial Radio Access Network
CN	Core Network
UE	User Equipment

FIG 1

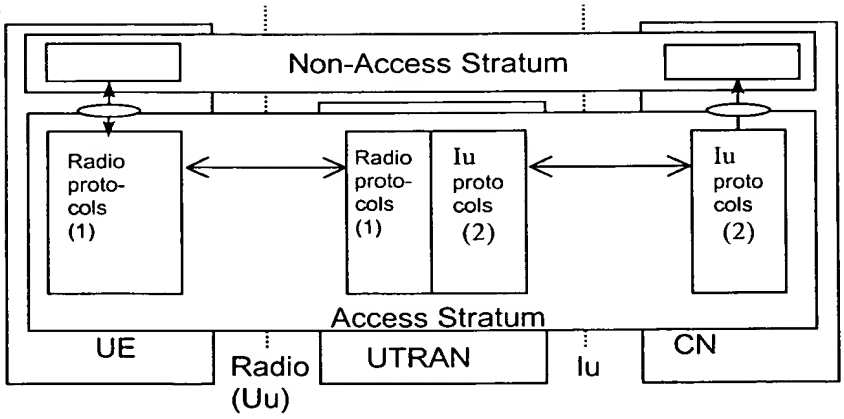


FIG 2

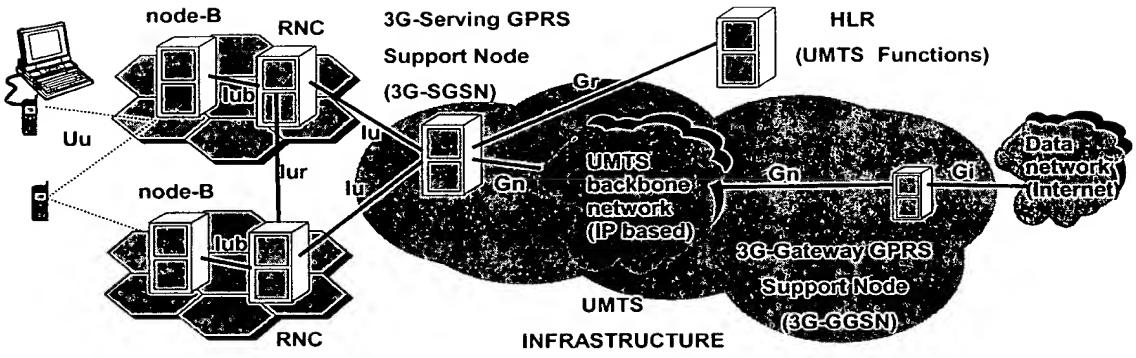

node-B
RNC
3G-Serving GPRS
Support Node
(3G-SGSN)
HLR
(UMTS Functions)
Gr
Iub
Iu
Uu
Iur
node-B
Iub
Iu
Gn
UMTS
backbone
network
(IP based)
Gn
Gi
Data
network
(Internet)
3G-Gateway GPRS
Support Node
(3G-GGSN)
RNC
UMTS
INFRASTRUCTURE

Fig. 3

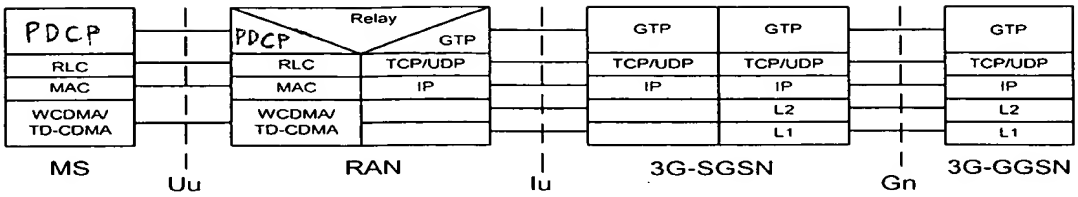


FIG 4A

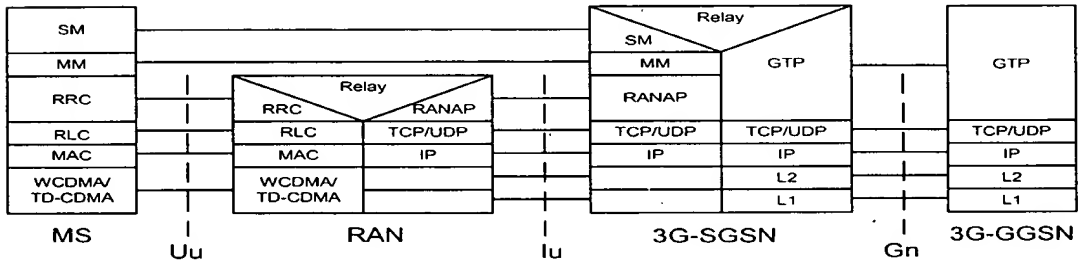


FIG 4B

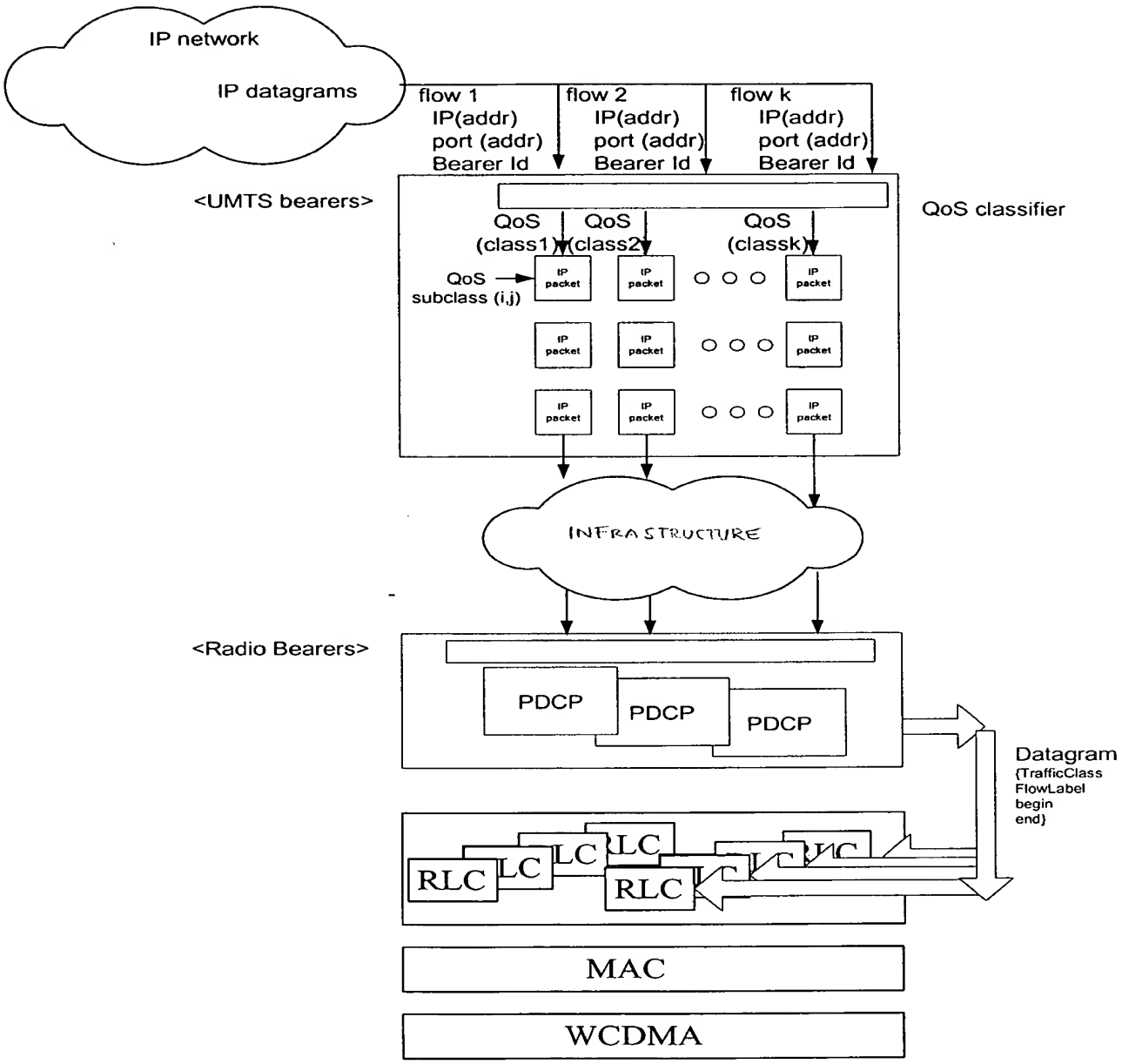

IP network
IP datagrams
flow 1
IP(addr)
port (addr)
Bearer Id
flow 2
IP(addr)
port (addr)
Bearer Id
flow k
IP(addr)
port (addr)
Bearer Id
<UMTS bearers>
QoS classifier
QoS (class1)
QoS (class2)
QoS (classk)
QoS subclass (i,j)
IP packet
INFRASTRUCTURE
<Radio Bearers>
PDCP
PDCP
PDCP
Datagram
{TrafficClass
FlowLabel
begin
end}
RLC
RLC
RLC
RLC
MAC
WCDMA

FIG. 5

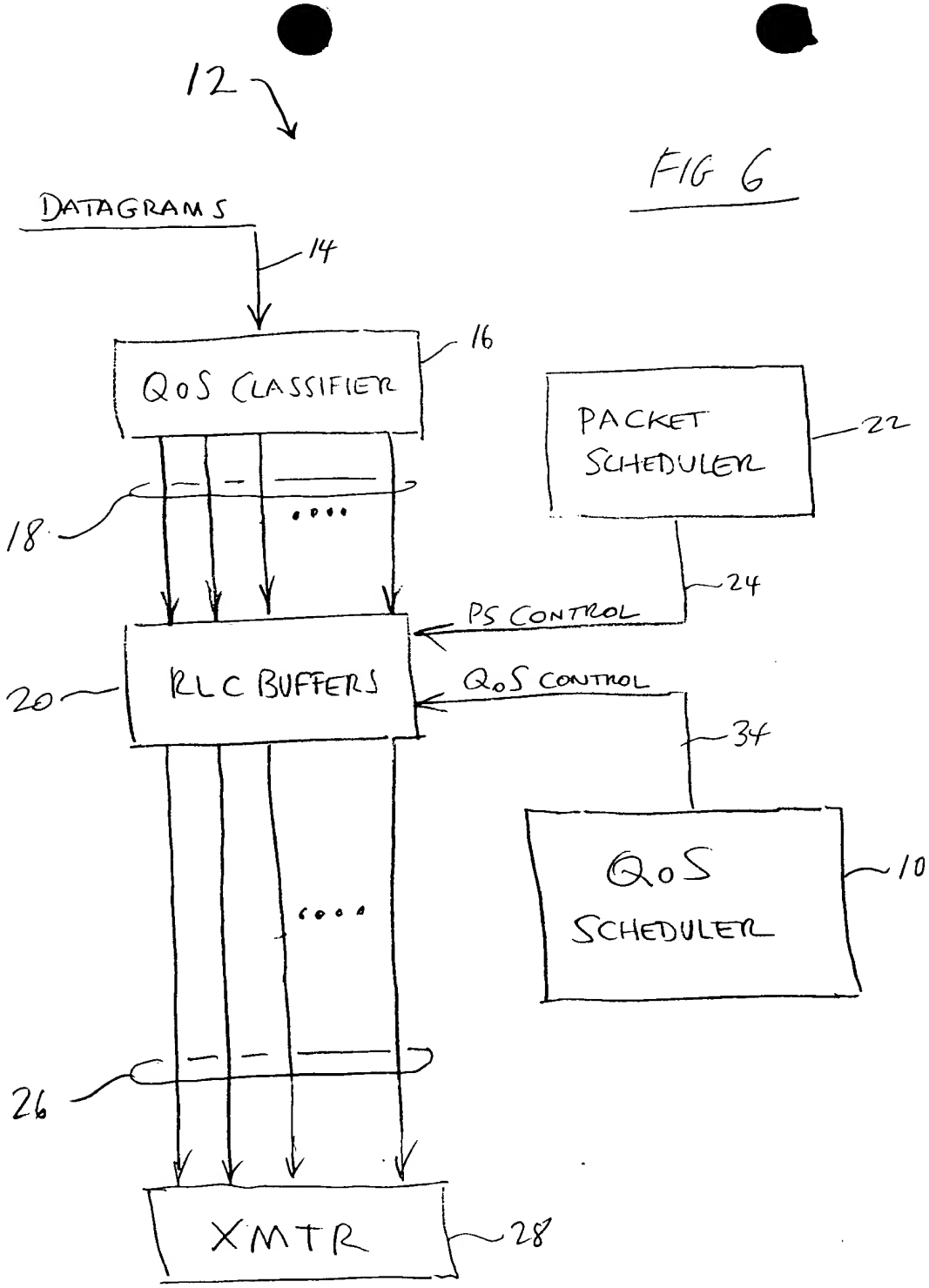
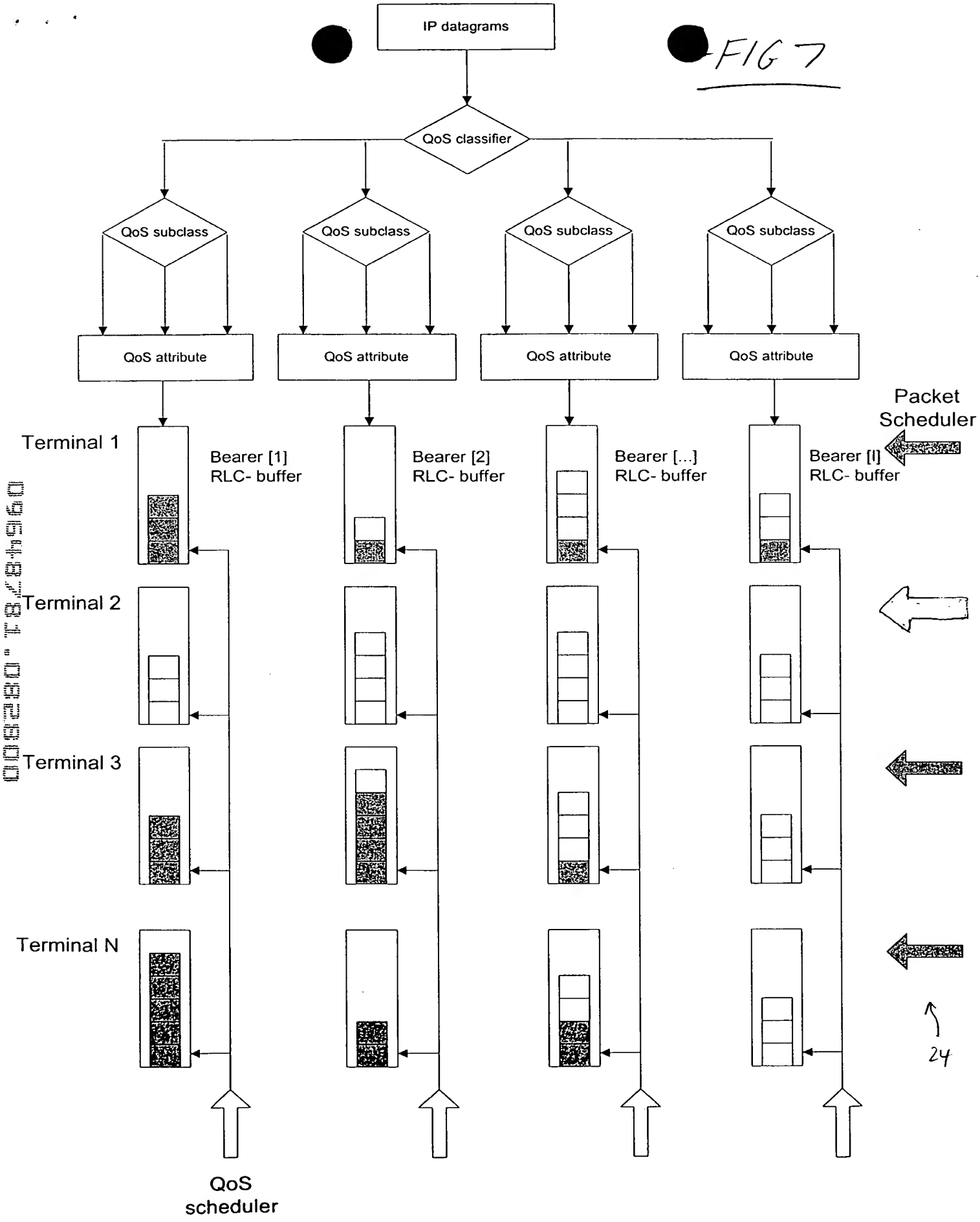

12
DATAGRAMS
14
QoS CLASSIFIER
16
PACKET SCHEDULER
22
18
24
PS CONTROL
RLC BUFFERS
20
QoS CONTROL
34
QoS SCHEDULER
10
26
XMTR
28

FIG 6

FIG 7


IP datagrams
QoS classifier
QoS subclass
QoS subclass
QoS subclass
QoS subclass
QoS attribute
QoS attribute
QoS attribute
QoS attribute
Packet Scheduler
Terminal 1
Terminal 2
Terminal 3
Terminal N
Bearer [1] RLC- buffer
Bearer [2] RLC- buffer
Bearer [...] RLC- buffer
Bearer [I] RLC- buffer
QoS scheduler
24

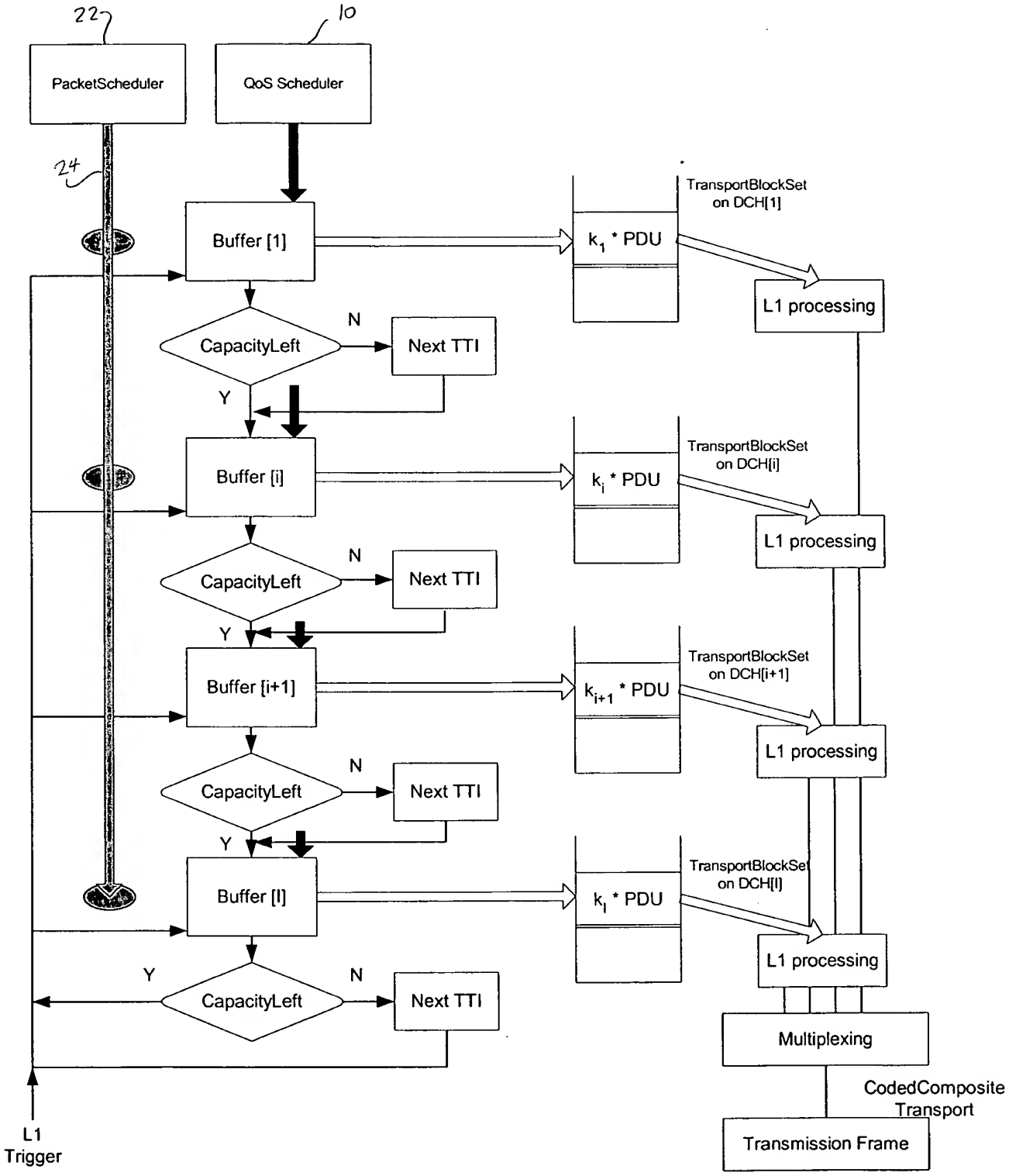

22
10
PacketScheduler
QoS Scheduler
24
Buffer [1]
TransportBlockSet on DCH[1]
k_1 * PDU
L1 processing
CapacityLeft
N
Next TTI
Y
Buffer [i]
TransportBlockSet on DCH[i]
k_i * PDU
L1 processing
CapacityLeft
N
Next TTI
Y
Buffer [i+1]
TransportBlockSet on DCH[i+1]
k_{i+1} * PDU
L1 processing
CapacityLeft
N
Next TTI
Y
Buffer [I]
TransportBlockSet on DCH[I]
k_I * PDU
L1 processing
Y
CapacityLeft
N
Next TTI
Multiplexing
CodedComposite Transport
Transmission Frame
L1 Trigger

FIG 8

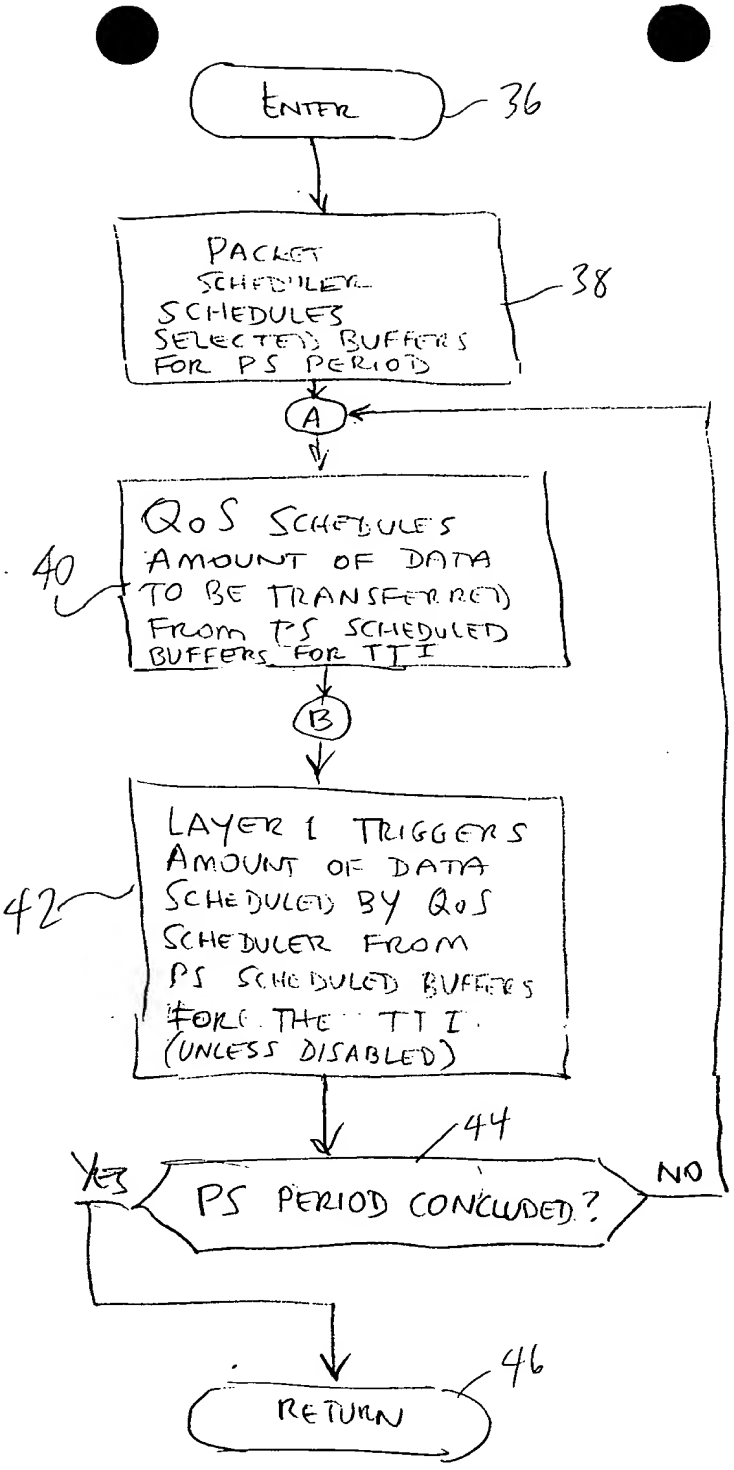

ENTER
36
PACKET SCHEDULER SCHEDULES SELECTED BUFFERS FOR PS PERIOD
38
A
QoS SCHEDULES AMOUNT OF DATA TO BE TRANSFERRED FROM PS SCHEDULED BUFFERS FOR TTI
40
B
LAYER 1 TRIGGERS AMOUNT OF DATA SCHEDULED BY QoS SCHEDULER FROM PS SCHEDULED BUFFERS FOR THE TTI (UNLESS DISABLED)
42
44
YES
PS PERIOD CONCLUDED?
NO
RETURN
46

FIG 9

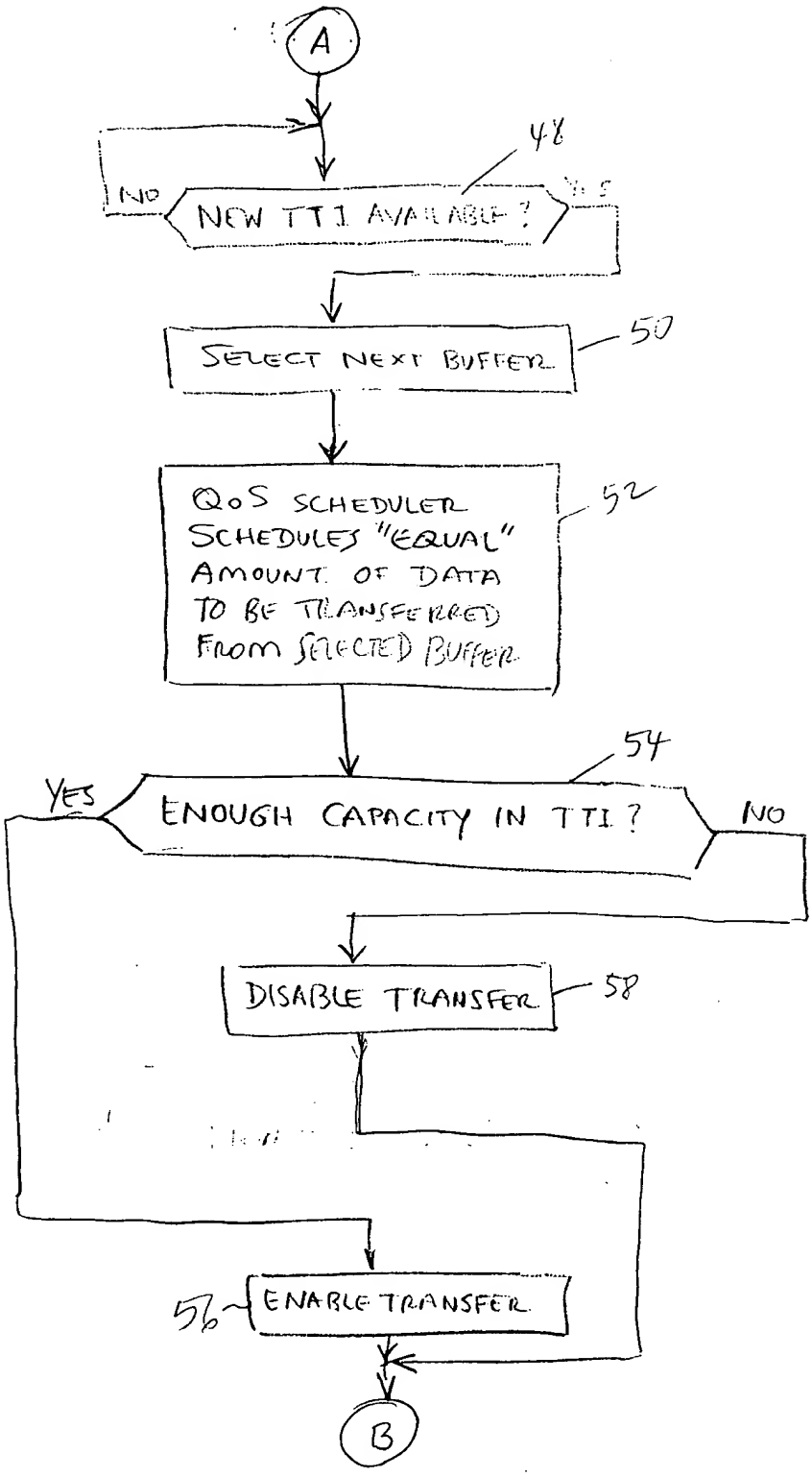

A
48
NO
NEW TTI AVAILABLE?
YES
50
SELECT NEXT BUFFER
52
QoS SCHEDULER SCHEDULES "EQUAL" AMOUNT OF DATA TO BE TRANSFERRED FROM SELECTED BUFFER
54
YES
ENOUGH CAPACITY IN TTI?
NO
58
DISABLE TRANSFER
56
ENABLE TRANSFER
B

FIG 9A

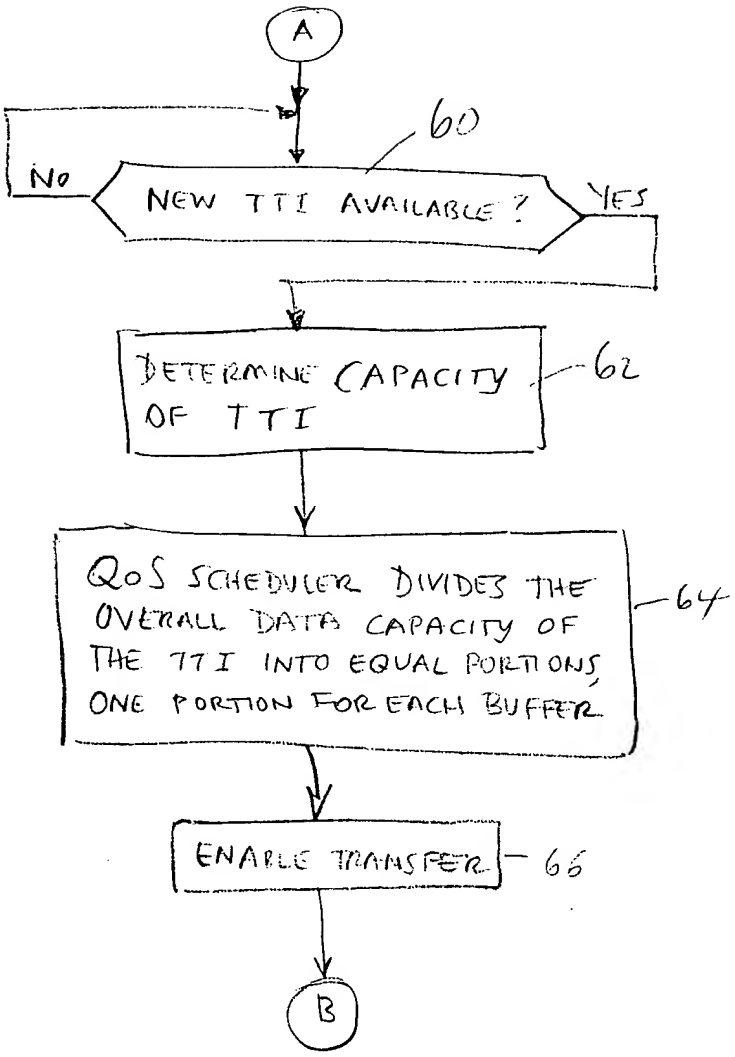

A
60
No
NEW TTI AVAILABLE?
YES
DETERMINE CAPACITY OF TTI
62
QoS SCHEDULER DIVIDES THE OVERALL DATA CAPACITY OF THE TTI INTO EQUAL PORTIONS, ONE PORTION FOR EACH BUFFER
64
ENABLE TRANSFER
66
B

FIG 9B

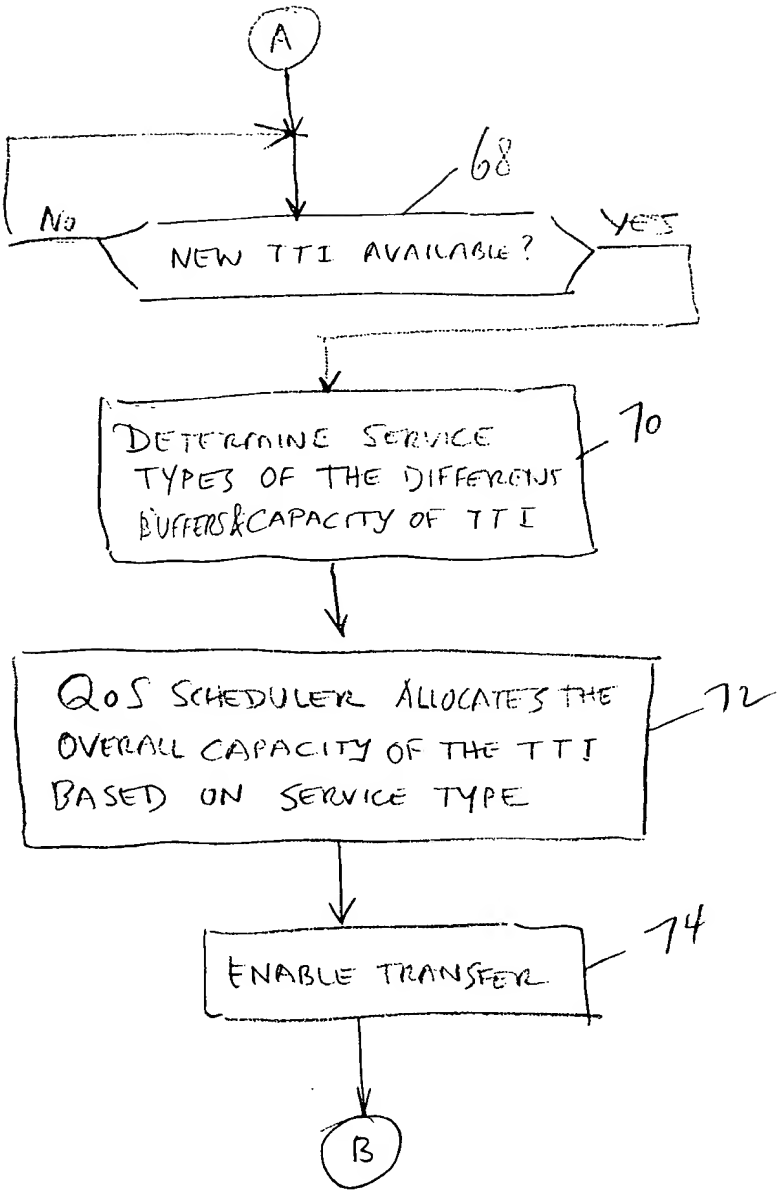

A
68
NO
NEW TTI AVAILABLE?
YES
DETERMINE SERVICE TYPES OF THE DIFFERENT BUFFERS & CAPACITY OF TTI
70
QoS SCHEDULER ALLOCATES THE OVERALL CAPACITY OF THE TTI BASED ON SERVICE TYPE
72
ENABLE TRANSFER
74
B

FIG 9C

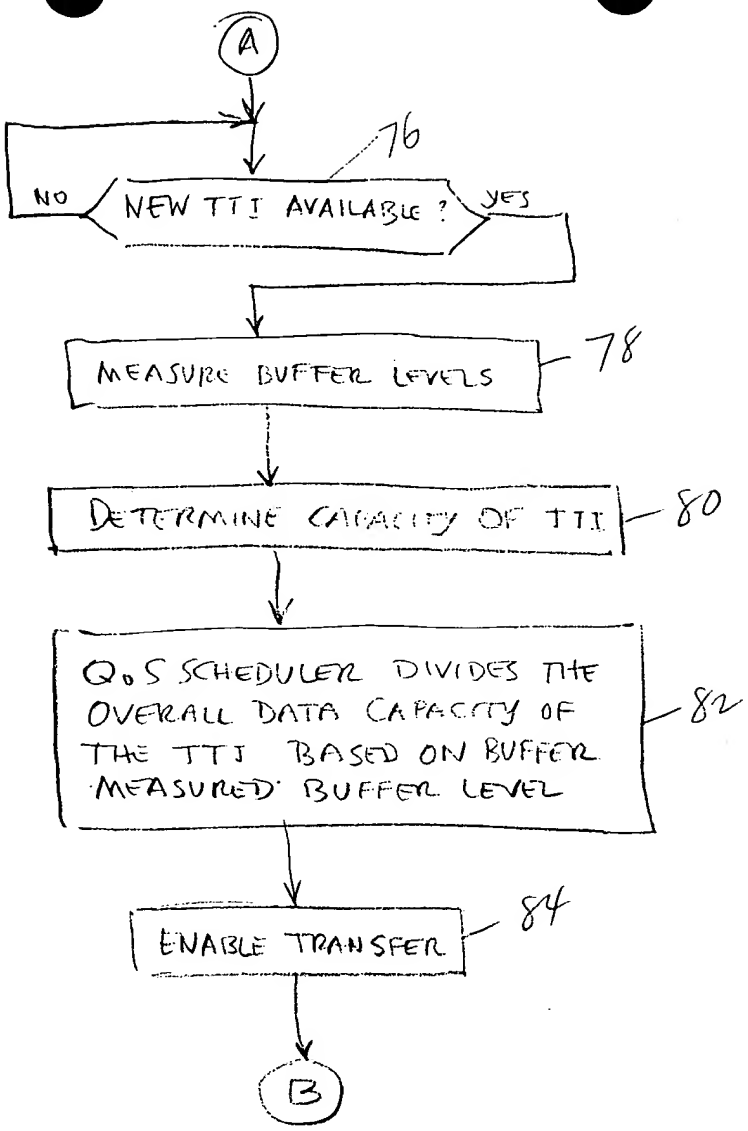

A
76
NO
NEW TTI AVAILABLE ?
YES
MEASURE BUFFER LEVELS
78
DETERMINE CAPACITY OF TTI
80
QoS SCHEDULER DIVIDES THE OVERALL DATA CAPACITY OF THE TTI BASED ON BUFFER MEASURED BUFFER LEVEL
82
ENABLE TRANSFER
84
B

FIG 9D

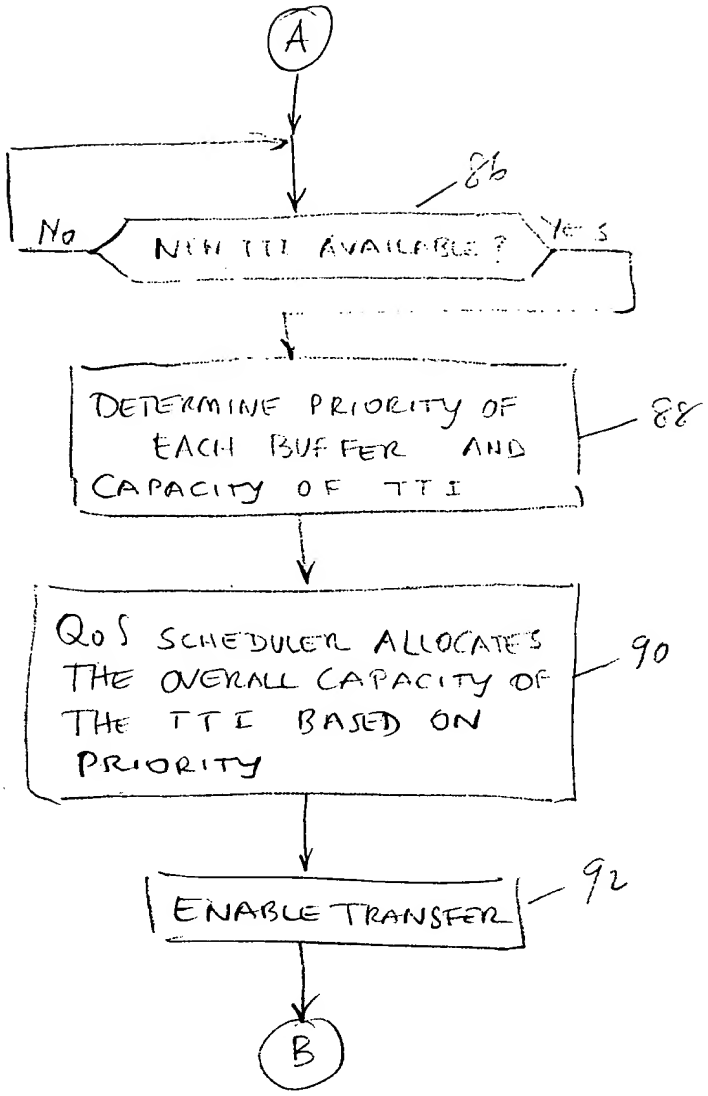

A
86
No
NEW TTI AVAILABLE?
Yes
DETERMINE PRIORITY OF EACH BUFFER AND CAPACITY OF TTI
88
QoS SCHEDULER ALLOCATES THE OVERALL CAPACITY OF THE TTI BASED ON PRIORITY
90
ENABLE TRANSFER
92
B

FIG 9E

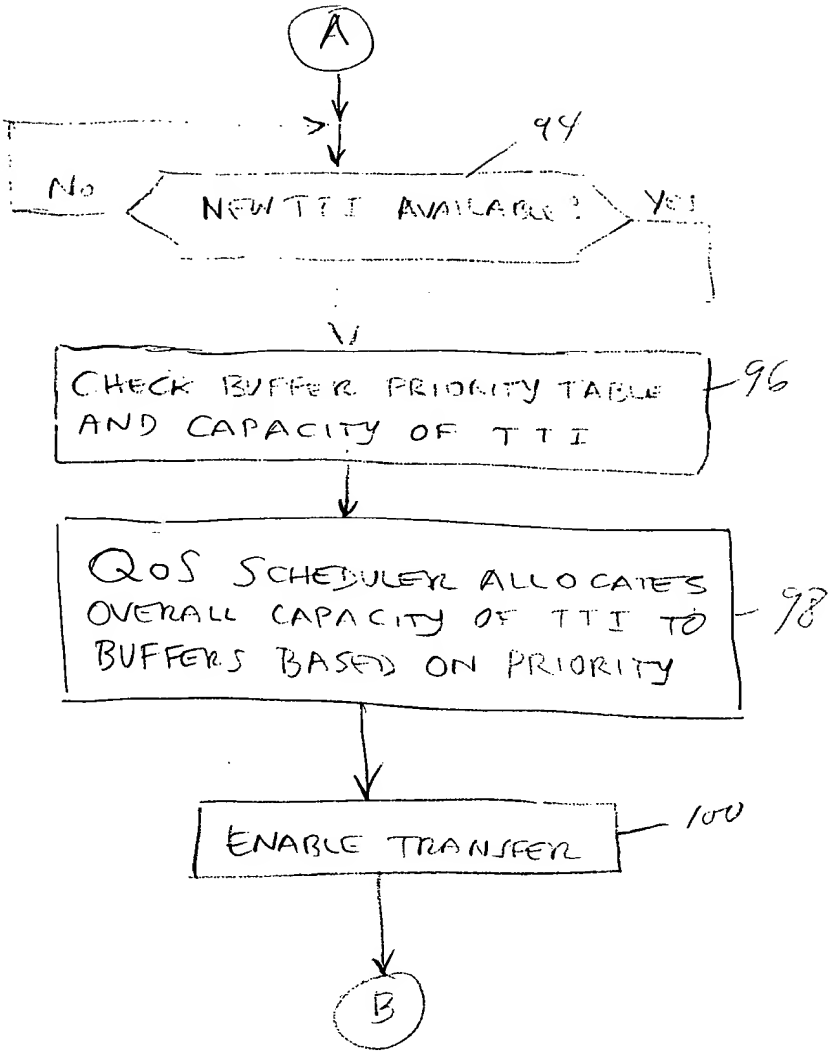

A
94
NO
NEW TTI AVAILABLE ?
YES
CHECK BUFFER PRIORITY TABLE AND CAPACITY OF TTI
96
QoS SCHEDULER ALLOCATES OVERALL CAPACITY OF TTI TO BUFFERS BASED ON PRIORITY
98
ENABLE TRANSFER
100
B

FIG 9F

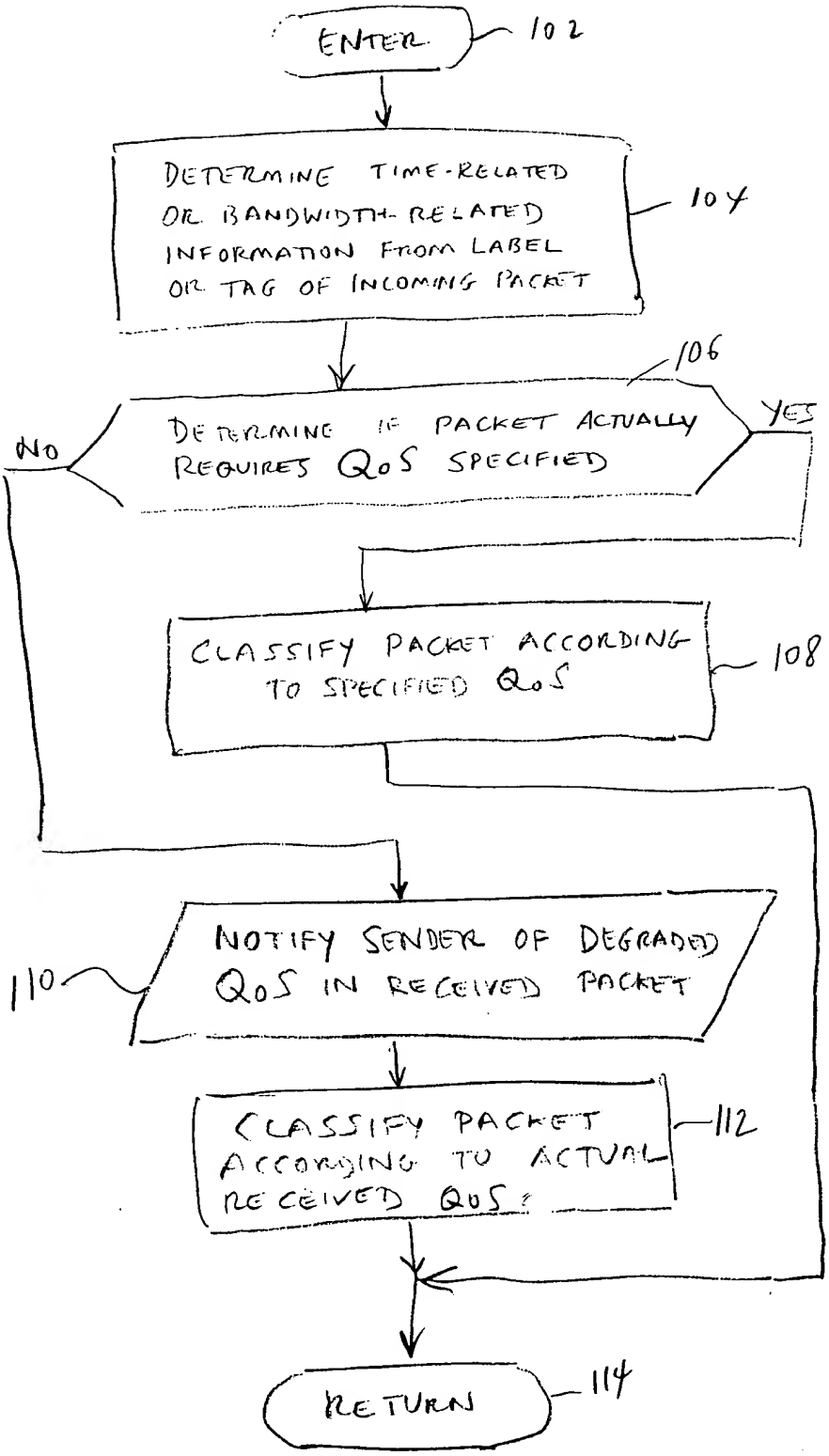
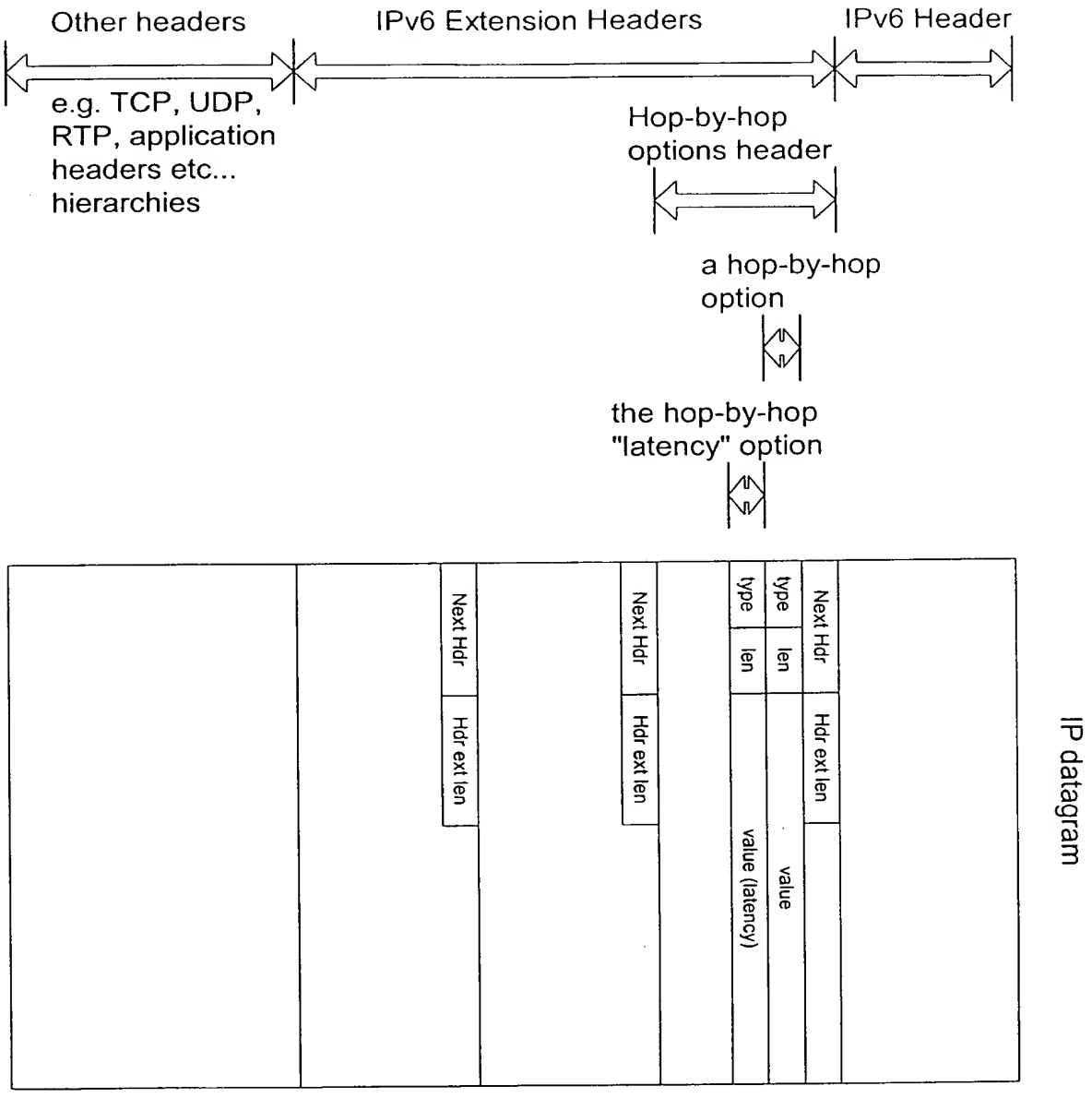


FIG 10

FIG 11



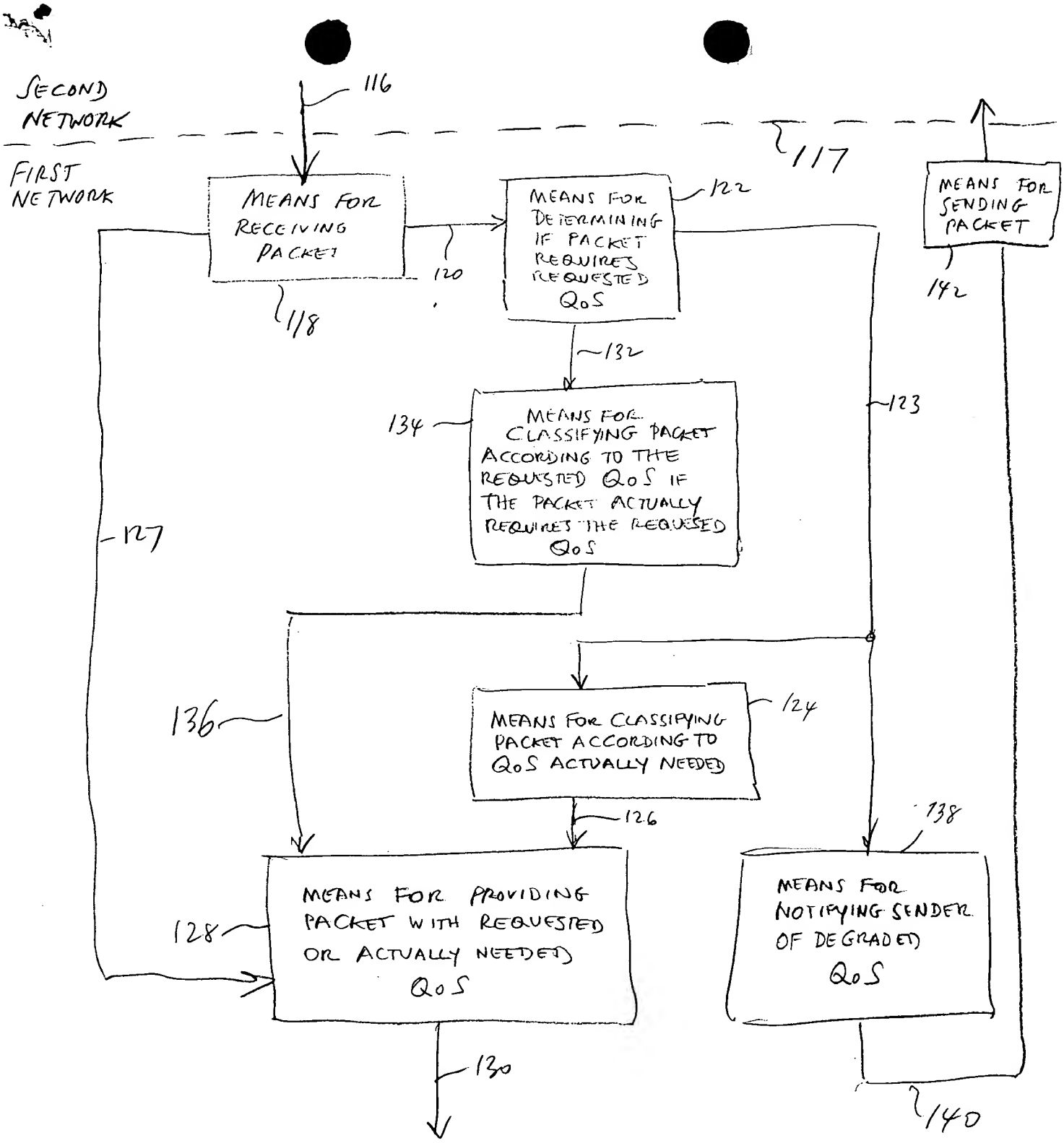

SECOND NETWORK
FIRST NETWORK
116
117
MEANS FOR RECEIVING PACKET
118
120
MEANS FOR DETERMINING IF PACKET REQUIRES REQUESTED QoS
122
MEANS FOR SENDING PACKET
142
132
MEANS FOR CLASSIFYING PACKET ACCORDING TO THE REQUESTED QoS IF THE PACKET ACTUALLY REQUIRES THE REQUESTED QoS
134
123
127
MEANS FOR CLASSIFYING PACKET ACCORDING TO QoS ACTUALLY NEEDED
124
136
126
138
MEANS FOR PROVIDING PACKET WITH REQUESTED OR ACTUALLY NEEDED QoS
128
MEANS FOR NOTIFYING SENDER OF DEGRADED QoS
130
140

FIG 12